

REMARKS

Claims 1-62 are pending in this application. Claims 39-49 and 52 (originally numbered 40-50 and 53) are withdrawn in response to a restriction requirement wherein Applicants elected Claims 1-38, 50, 51, and 52. Applicant has added, new claims 53-62. Applicant reserves the right to file continuing applications directed to the non-elected claims, Claims 39-49 and 52.

By this paper Claims 1-5, 8, 9, 10, 13, 15-18, 21, 22, 23, 26, 28-31, 35-38, 50, and 51 have been amended, and Claims 53-62 have been added, to more particularly point out and distinctly claim the subject matter that applicant regards as the invention. The amendments to Claims 36-38, 50, and 51 correct misnumbering of the originally filed claims. The amendments and new claims contain no new matter and are fully supported in the specification, see for example, paragraphs 30-33 and 47-48 and Figures 4 and 6 of the present application.

Objection to the Drawings

On page 2 of the pending Office Action, the Examiner stated that corrected drawings in compliance with 37 CFR § 1.121(d) are required because Figure 1-3 required designation as prior art. Applicant has amended Figures 1-3, and 5 to include a legend designating the Figures as prior art.

Replacement drawings with "Replacement Sheet" in the top margin are presented in the "Replacement Drawings Sheets" accompanying this request for reconsideration.

Objection to the Specification

On page 3 of the pending Office Action, the Examiner objected to the specification stating that it did not provide proper antecedent basis for the subject matter of Claims 14 and 27. Applicant notes that Claims 14 and 27 were part of the originally filed specification. Applicant has amended paragraph 043 of the specification to insert text from these claims into the specification and provide proper antecedent basis for the subject matter of Claims 14 and 27. Thus, Applicant respectfully request that the rejection be withdrawn.

Claim Objections

On page 3 of the pending Office Action, the Examiner objected to the numbering of the claims originally numbered 36-53. By this paper, Applicant has amended Claims 35-38, 50, and 51 to correct the misnumbering of the originally filed claims, as well as the misnumbered and now withdrawn claims. Thus, Applicant respectfully request that the objection be withdrawn

Rejection of Claims Under 35 U.S.C. § 112

Claims 2-9, 11, 12, 15-22, 24, 25, and 28-35

On page 4 of the Office Action, the Examiner objected to Claims 2-9, 11, 12, 15-22, 24, 25, and 28-35 stating that the phrase "the first and second conducting planes" lacks antecedent basis. By this paper the applicant has amended Claims 1-5, 10, 15-18, 23, and 28-32 so as to provide antecedent basis for claim terms, for consistency in terminology. Thus, Applicant respectfully requests that the objection be withdrawn.

Claim 6

On page 4 of the Office Action, the Examiner objected to Claim 6 stating that the phrase "the first and second conducting pads" lacks antecedent basis. By this paper the applicant has amended Claim 1 to provide antecedent basis for the phrase "the first and second conducting pads." Thus, Applicant respectfully requests that the objection be withdrawn.

Claims 9, 22, and 35

On page 4 of the Office Action, the Examiner objected to Claims 9, 22, and 35 stating that the phrase "the combined inductance and capacitance of the discrete conductors" lacks antecedent basis. By this paper the applicant has amended Claims 9, 22, and 35 to recite that a combined inductance and capacitance of the resonant element forms an electromagnetically resonant shunt circuit between the upper and lower conducting planes for a certain frequency range. Thus, Applicant respectfully requests that the objection be withdrawn.

Claims 13 and 26

On page 4 of the Office Action, the Examiner objected to Claims 13 and 26 stating that the phrase “the number, geometry, inductance, and capacitance of the discrete conductors” lacks antecedent basis. By this paper the applicant has amended Claims 13 and 26 to recite that a quantity, geometry, inductance, and capacitance of the resonators effects an electromagnetic stop band within the waveguide. Thus, Applicant respectfully requests that the objection be withdrawn.

Rejection of Claims Under 35 U.S.C. § 102

On page 4 of the Office Action, the Examiner rejected Claims 1, 3, 5, 8-12, 16-18, 21-25, 29, 31, 43-38, 50, and 51 under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,886,597 to Riad (“Riad”).

Claims 1, 3, 5, 8, and 9

In rejecting the Claims, the Examiner asserted that Figures 2, 3, and 12A-14 of Riad disclose all of the limitations of Claim 1. Applicant respectfully submits that Riad does not disclose all of the limitations of Claim 1.

Riad describes providing “a connection between layers of a multilayer support structure having, at a predetermined RF frequency, a very low impedance, effectively functioning as a short circuit.” (Riad Col. 2, lines 11-14). Riad describes “a main ground 10, a parallel second ground conductor 12 spaced above the main ground a distance D1 by a dielectric 13, and a plurality of resonant vias 14.” (Riad Col. 3, lines 53-56 and Figure 2). In Riad “each resonant via 14, for this example, comprises a via post 14a extending a length D2 from a first surface 14b of the capacitor plate 14c to the second ground conductor.” (Riad Col. 3 lines 56-59 and Figure 2). Thus, Riad discloses a resonant via with one end of the resonate via connected to a conducting plane. Likewise, in Figures 12A-14, Riad discloses resonant vias with one end of the resonate via connected to a conducting plane. For example, Riad describes Figure 12a as showing “an example of a top conductor 50 connected by a resonant via 52 to a bottom conductor 54, where 54 could, for example, be a ground plane, and by a conventional via 56 to a center plane conductor 58.” (Riad Col. 6, lines 28-32, and Figure 12).

Applicant respectfully submits that Riad does not disclose all of the limitations of Claim 1. On page 5 of the Office Action, in rejecting Claim 1, the Examiner asserted that Riad disclosed “an upper conducting plane disposed in a first plane of symmetry (see fig. 12A, where the top layer/conductor 50 is located at)” and “an upper conducting pad 50 coupled to one end of the resonant via.” Thus, it appears that the Examiner is asserting that the upper conducting plane and the upper conducting pad disclosed by Riad are the same thing, item 50 of Figure 12A.

In contrast to Riad, Claim 1 recites “a first conducting plane disposed in a first plane of symmetry” and “a first conducting pad coupled proximate to one end of the resonant via and disposed in a third plane substantially parallel to the first plane of symmetry.” Thus, unlike Riad, where one end of the resonant via is connected to one of the conducting planes, Claim 1 recites a first conducting plane disposed in a first plane and a first conducting pad disposed in a third plane. Further, as the Examiner reads Riad, the via is connected to the upper conducting plane. This is in contrast to Claim 1, which recites that the via is physically connected to only the first and second conducting pads.

In rejecting Claim 3, the Examiner asserts that “Riad (fig. 12D) discloses the upper conducting pad 68 is internal relative to the first and second conducting planes 50, 54.” But, Riad describes that Figure 12 D shows “the center plane conductor 58 connected to the top layer 50 by a first resonant via 68 and to the bottom layer 54 by a second resonant via 70.” (Riad Col. 6, lines 47-49). The two vias described by Riad are in contrast to Claim 1, from which Claim 3 depends, that recites “a resonant via” and “a first conducting pad coupled to one end of the resonant via” and “a second conducting pad coupled to the other end of the resonant via.”

Applicant respectfully submits that Claim 1 is patentable over Riad. In addition, Claims 3, 5, 8, and 9 depend directly from Claim 1, and are therefore also patentable. Thus, Claims 1, 3, 5, 8, and 9 are in condition for allowance.

Claims 10-12, 16-18, 21, 22, and 50

Claim 10 includes limitations that are similar to Claim 1. In rejecting Claim 10, the Examiner asserted that the limitation recited in Claim 10 of a plurality of

resonators is disclosed by Riad. However, as noted above in relation to Claim 1, Riad does not disclose a first conducting plane disposed in a first plane and a first conducting pad disposed in a third plane. Claim 10 also recites a first conducting plane disposed in a first plane and a first conducting pad disposed in a third plane.

Applicant respectfully submits that Claim 10 is patentable over Riad. In addition, Claims 11, 12, 16-18, 21, 22, and 50 depend, either directly or indirectly, from Claim 10, and are therefore also patentable. Thus, Claims 10-12, 16-18, 21, 22, and 50 are in condition for allowance.

Claims 23-25, 29, 31, 34-38, and 51

Claim 23 includes limitations that are similar to Claim 1. In rejecting Claim 23, the Examiner asserted that the limitation recited in Claim 23 of a plurality of resonators is disclosed by Riad. However, as noted above in relation to Claim 1, Riad does not disclose a first conducting plane disposed in a first plane and a first conducting pad disposed in a third plane. Claim 23 also recites a first conducting plane disposed in a first plane and a first conducting pad disposed in a third plane.

Applicant respectfully submits that Claim 23 is patentable over Riad. In addition, Claims 24, 25, 29, 31, 34-38, and 51 depend, either directly or indirectly, from Claim 10, and are therefore also patentable. Thus, Claims 23-25, 29, 31, 34-38, and 51 are in condition for allowance.

Rejection of Claims Under 35 U.S.C. § 103

On page 6 of the Office Action, the Examiner rejected Claims 6, 13, 14, 19, 26, 27, and 32 under 35 U.S.C. § 103(a) as being obvious in view of Riad.

Claims 6, 19, and 32

In rejecting Claims 6, 19, and 32, the Examiner asserted that "it would have been obvious to provide both first and second conducting pads internal relative to the first and second conducting planes since Riad (fig.12D) shows both upper and lower conducting pads of resonant vias are located in internal relative to the first and second conducting planes."

As noted above in relation to Claim 3, Riad discloses that Figure 12D shows "the center plane conductor 58 connected to the top layer 50 by a first resonant via 68 and to the bottom layer 54 by a second resonant via 70." (Riad Col. 6, lines 47-

49). The two vias described by Riad are in contrast to Claims 1, 10, and 23 from which Claims 6, 19, and 32 depend respectively, that recite “a resonant via” and “a first conducting pad coupled to one end of the resonant via” and “a second conducting pad coupled to the other end of the resonant via.” Furthermore, there is no suggestion or motivation to modify Riad such that the vias are physically connected to only the first and second conducting pads because Riad wants to connect the center plane to the top and bottom layer. Even if Riad could be modified such that the resonant vias were physically connected to only the first and second conducting pads such modification would make Riad inoperable because the center plane would no longer be connected to the top and bottom layers.

Applicant respectfully submits that Claims 6, 19, and 32 are patentable over Riad and are in condition for allowance.

Claims 13, 14, 26, and 27

In rejecting Claims 13, 14, 26, and 27, the Examiner asserted that “it would have been obvious to modified the number, geometry, inductance, capacitance, or spacing between the resonators to obtain a desired stop band frequency since Riad teaches that the capacitance and inductance in the resonant via can be varied (see col. 5).”

Claims 13 and 14 depend indirectly from Claim 10 and Claims 26 and 27 depend indirectly from Claim 23. As noted above, Riad does not disclose all of the limitations of Claims 10 and 23. For example, Riad does not disclose a first conducting plane disposed in a first plane and a first conducting pad disposed in a third plane, as recited in Claims 10 and 23.

Applicant respectfully submits that Claims 13, 14, 26, and 27 are patentable over Riad and are in condition for allowance.

Claims 2, 4, 7, 15, 17, 20, 28, 30, and 33

On page 7 of the Office Action, the Examiner rejected Claims 2, 4, 7, 15, 17, 20, 28, 30, and 33 under 35 U.S.C. § 103(a) as being unpatentable over Riad in light of U.S. Patent No. 6,538,538 to Hreish et al. (“Hreish”). The Examiner acknowledged that Riad does not disclose that “the upper and/or lower conducting pad is external relative to the first and second conducting planes” but asserted that

Hreish discloses this limitation. The Examiner states that "Hreish et al. (figs. 12 and 13) discloses a resonant via having upper and lower conducting pads 82, 84 is external relative to the first and second conducting planes." The Examiner also asserted that "it would have been obvious to an one of ordinary skill in the art to provide the upper and/or lower conducting pads external to the first and second conducting planes in the device of Riad to obtain a desired impedance characteristic/resonant frequency as taught by Hreish et al. (col. 8, lines 4-38)."

Applicant respectfully submits that neither Riad nor Hreish, neither individually nor in combination, disclose all of the limitations of Claims 2, 4, 7, 15, 17, 20, 28, 30, and 33. As noted above, Riad fails to disclose a first conducting plane disposed in a first plane and a first conducting pad disposed in a third plane and that the via is connected to physically connected to only the first and second conducting pads, as recited in Claims 1, 10, and 23 from which the rejected claims depend. Applicant respectfully submits that the addition of Hreish does not overcome these deficiencies.

Hreish describes a "printed circuit board (PCB) via [that] provides a vertical signal path between microstrip or stripline conductors formed on separate horizontal layers of a PCB." (Hreish (Col. 2, lines 28-30). Hreish goes on to describe that "stripline conductors 74 and 78 do contact vertical conductor 88 so that via 72 can provide a signal path between conductors 74 and 78." (Hreish Cole. 7, line 67- Col. 8, line 3, and Figure 11). This is in contrast to Claim 1, that recites the via is physically connected to only the first and second conducting pads.

Applicant respectfully submits that there would be no motivation to combine the teachings of Hreish with Riad. As described by Hreish, the "via adds shunt capacitance and series inductance to the signal path." (Hreish Col. 2, lines 30-32 and Figures 7, 10, and 18). This is in contrast to Riad who discloses a series inductive and capacitive network connected between two different conducting planes. (See for example, Riad Figure 3). There would be no reason to combine Hreish's shunt capacitance and series inductance with Riad's series inductive and capacitive network. Even if the teachings of Riad could be combined with the teachings of Hreish, addition of shunt capacitance between Riad's via and a signal

path, as taught by Hreish, would be detrimental to Riad because it would provide a path for coupling noise into the signal path, thus making Riad inoperable.

Applicant respectfully submits that Claims 2, 4, 7, 15, 17, 20, 28, 30, and 33 are patentable over Riad and Hreish, both individually or in combination. Thus, Claims 2, 4, 7, 15, 17, 20, 28, 30, and 33 are in condition for allowance.

Art of Record not Relied On

On page 7 of the Office Action, the Examiner stated that "Yamamoto et al. (fig 2) discloses a via disposed inside of the upper and lower grounding plane."

Applicant respectfully submits that U.S. Patent No. 5,451,917 to Yamamoto et al. ("Yamamoto") does not disclose all of the limitations recited in the pending claims.

Yamamoto describes a high frequency choke circuit. Yamamoto describes that "according to the invention, a dielectric layer has grounding conductors formed on both surfaces thereof and a lead line formed at the center . . . at least one capacitor conductor . . . at least one through-hole is formed in the dielectric layer to connect the lead line and the capacitor conductor." (Yamamoto Col. 1, lines 54-63).

Thus, Yamamoto, similarly to Hreish, describes a via that is connected to a signal layer, or lead line. This is in contrast to Claims 1, 10, and 23 that recite the via is physically connected to only the first and second conducting pads. In addition, the combination of Yamamoto and Hreish would have a via that is connected to a signal layer, or lead line, in contrast to claims 1, 10, and 23. Also, the combination of Yamamoto and Riad, similarly to the combination of Hreish and Riad, would be detrimental to Riad because it would provide a path for coupling noise into the signal path, thus making Riad inoperable.

Applicant respectfully submits that Yamamoto, neither individually nor in any combination with Riad or Hreish, disclose all of the limitations of the pending claims.

Thus, Applicant submits that all pending claims are patentable and in condition for allowance.

New Claims 53-62

Claims 53-56

New claims 53 and 54 depend from Claim 10, and new Claims 55 and 56 depend from Claim 23. As noted above, the art of record does not disclose, neither

individually nor in combination, all of the limitations of Claims 10 and 23. Thus Applicant respectfully submits that Claims 53-56 are patentable over the art of record and are in condition for allowance.

Claims 57-62

New Claims 57-62 have been added to more particularly point out and distinctly claim the subject matter that Applicant regards as the invention. Claims 57-62 all recite limitations that are not disclosed, neither individually nor in combination, in the art of record. For example, Claims 57 and 58 recite that the resonant via is electrically coupled to only the conducting pads at all frequency and is also capacitively coupled to the first and second conducting planes. Likewise, Claim 59 recites that there is a lower impedance between the resonant via and the first and second conducting planes at desired frequencies and a higher impedance between the resonant via and the first and second conducting planes at other frequencies. Claim 60 recites that the first and second conducting pads that are capacitively coupled wherein the first conducting pad is connected to the first conducting plane and the second conducting pad is connected to the second conducting plane. The capacitive coupling of the two conducting pads is in contrast to Riad where the via is connected to one of the conducting planes and capacitively coupled to the other conducting plane. Claims 61-62 recite a resonant via that is capacitively coupled to the first and second conducting planes and the resonant via comprises an inductance. These are all in contrast to Riad where one end of the resonant via is in physical contact, and therefore electrical contact with, the conducting plane at all frequencies.

Claims 57-62 all recite limitations that are not disclosed, neither individually nor in combination, in the art of record. Hreish and Yamamoto disclose a via that provides an electrical connection to signal conductors. Thus, the via disclosed by Hreish and Yamamoto is not electrically connected to only the conducting pads at all frequencies, nor does the via provide a low impedance to only the first and second conducting planes at desired frequencies.

As noted above, there would be no motivation to combine the teachings of Riad, Hreish and Yamamoto because the combination would be detrimental to Riad,

in that it would provide a path for coupling noise into the signal path, thus making Riad inoperable. Furthermore, any combination of Riad, Hreish and Yamamoto would not provide the limitation of Claims 57, and 58 that the resonant via is electrically coupled to the conducting pads at all frequencies and capacitively coupled to the first and second conducting plane, nor the limitation of Claim 59 that there is a lower impedance between the resonant via and only the first and second conducting planes at desired frequencies and a higher impedance between the resonant via and the first and second conducting planes at other frequencies, nor the limitation of Claim 60 that the conducting pads are capacitively coupled, nor the limitations of Claims 61-62 that the resonant via is capacitively coupled to the first and second conducting planes wherein the resonant via comprises an inductance.

Applicant respectfully submits that new Claims 57-62 are patentable over the art of record, either individually or in any combination. Thus, Applicant submits that Claims 57-62 are patentable and in condition for allowance.

Information Disclosure Statement

On page 7 of the Office Action, the Examiner requested that Applicant submit the publication date for the article entitled "A Vertical Leap for Microchips" by Lee. The article was published in Scientific American, January 2002, at pages 52-59.

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Response to Office Action and Request for Reconsideration

Conclusion

Applicant respectfully submits that all the pending claims in the application, Claims 1-38, 50, 51, and 53-62, are in condition for allowance. Reconsideration and further examination of the application are requested. A Notice of Allowance is solicited.

Respectfully submitted,
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